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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/636,069 04/22/96 SANDHU

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EXAMINER

MM91/0123

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KIELIN, E
ART UNIT

PAPER NUMBER

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/636,069

Applicant(s)

Sandhu et al.

Examiner

Erik Kielin

Group Art Unit

2813

☒ Responsive to communication(s) filed on Dec 4, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1, 2, 4-6, and 31-54 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1, 2, 4-6, and 31-54 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4-10, 31, 33-36, 38, 39-41, 42, 43-44, 45-47, 48-49, 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2-050966 (Hisamune) in view of U.S. Patent 5,000,113 (Wang et al.).

Hisamune clearly discloses Applicant's invention, but does not (1) expressly teach a temperature range of "at least 480 C to 700 C"; (2) specifically indicate a pressure range of 200 to 760 during deposition; or (3) specifically state in the Abstract that the functional atomic oxygen would be increased by the light source and thereby reduce the fixed charge in the oxide layer.

Regarding (1) and (2), (and claims 33-35) Wang et al. teach a similar TEOS/ozone process where helium is used as a carrier gas and a pressure range of about 10-200 torr is taught (col. 20, lines 40-49).

It has been held that ranges near the prior art general conditions is *prima facie* obvious absent evidence of unexpected results. See *In re Huang*, 40 USPQ2d 1685, 1688(Fed. Cir.

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1996)(claimed ranges of a result effective variable, which do **not** overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in **kind** and not merely in degree from the results of the prior art). Applicant's specification indicates deposition parameters including a temperature range of 200-700 C with a preferred of 480 C and a pressure range of 0.1 to 760 torr with 200 torr preferred (specification, page 7) -- not the ranges now claimed: 480-700 C and 200-760 torr. Applicant's specification provides no evidence to indicate unexpected results as required by the precedent in *In re Huang*. Instead, Applicant's specification indicates that Hisamune's temperature is near Applicant's preferred value and Wang's pressure of 200 torr is at Applicant's preferred value.

Hisamune teaches that films may be deposited at temperatures lower than 400° C while still achieving **sufficient** growth rates which does not rule out higher temperatures. Therefore, it would have been obvious to choose the temperature of Applicant's claimed process because Hisamune teaches temperatures near Applicant's and because Hisamune teaches that temperature is related to deposition rate and film density, so that even though lower temperatures may be usable, it would be obvious to increase temperature to provide an even faster deposition rate and more efficient process which provides a quality silicon oxide film, according to the precedent set by *In re Huang*. Further, Applicant's specification fails to show any criticality to the any temperature range -- especially not the one now claimed -- and has not presented evidence of unexpected reduction of fixed charge of the oxide layer by using either the temperature or the

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pressure range now claimed, which is different in kind and not degree, as required by the precedent established in *In re Huang*.

Further, it has been held that optimization of result effective variables is obvious. Therefore, it would have been obvious to optimize the pressure and temperature to provide effective oxidation of TEOS to form the film taught by the Hisamune reference, according to the precedent set by *In re Aller*. It further would have been obvious to choose Applicant's claimed pressures in the Hisamune process because Wang et al. teaches a similar process with overlapping pressures, according to the precedent set by *In re Wertheim*.

Also, it would have been obvious to use helium as a carrier gas because Hisamune suggests that other carrier gases may be used and because Wang et al. teaches it is well known in the art for use in similar processes.

Regarding (3), since Hisamune uses the same light source as Applicant, it is inherent that the functional oxygen concentration would be elevated and therefore have the same effect on reducing the fixed charge as Applicant has recognized. The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. See *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also *In re Swinhart*, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess

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the characteristics relied on) and *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 USC 102 or obviousness under 35 USC 103).

Regarding claim 36, the only difference between applicant's claim 36 and the Hisamune process is that the exact ozone concentrations are not taught. However, it has been held that optimization of result effective variables is obvious. See *In re Aller* 105 USPQ 233, 255 (C.C.P.A. 1955). Therefore, it would have been obvious to optimize the required ozone concentrations to provide effective oxidation of TEOS to form the film taught by the Hisamune reference, according to the precedent set by *In re Aller*.

3. Claims 32, **51**, **52**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisamune as applied to claim 31 above, and further in view of U.S. Patent 4,287,083 (McDowell et al.).

Hisamune teaches that a mercury lamp should be used, but does not specifically teach a mercury arc vapor lamp.

However, McDowell et al. teach that in the coating industry, mercury arc vapor lamps are well known for providing UV radiation.

Therefore, it would have been obvious to one of ordinary skill in the art at time of the invention to apply the teachings of McDowell et al. because a mercury lamp is required and

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McDowell teaches that mercury arc vapor lamps work effectively for providing the requisite UV radiation.

4. Claims 1, 2, 4-10, 41, 43-44, 45-47, 48-49, 50 are rejected under 35 U.S.C. 103(a) as unpatentable over JP 2-050966 (Hisamune) in view of Wang and U.S. Patent 5,633,211 (Imai et al.).

Hisamune clearly teaches applicant's process of illuminating ozone and a silicon source gas with a mercury arc lamp to deposit silicon dioxide onto a wafer surface. Hisamune further teaches that the reason for irradiating the inside of the reaction furnace with UV radiation is to induce a photochemical reaction of the gaseous starting materials with ozone (translation, p. 5, lns. 20-21). Wang teaches the carrier gas and similar deposition pressures.

Hisamune teaches a phosphorus dopant may be added, but does not teach a second dopant. However, Imai teaches that it is conventional to use both boron and phosphorus to form BPSG films which reflow at low temperatures (col. 1, lines 35-42 and col. 2, lines 6-10).

Applicant's claimed boron source gases are taught (col. 1, lines 50-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to also use a boron source gas to allow reflow at lower temperatures to provide for a more planar surface, as taught by Imai.

Regarding claim 46, the Hisamune process does not teach a fluorinated precursor.

However, Imai teaches that TEOS may be substituted with a fluorinated precursor to provide better flow of the deposited layer (Abstract and col. 5, lines 41-42). Therefore, it would have been

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obvious to one of ordinary skill in the art at the time of the invention to apply the fluorinated precursor teachings of Imai to the Hisamune process for the reasons given by Imai.

5. Claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisamune in view of Wang and Imai as applied to claim 52 above, and further in view of McDowell et al..

Hisamune and Imai do not teach a mercury arc vapor lamp.

McDowell et al is applied as above.

Response to Arguments

6. Applicant's arguments filed 12/4/00 have been fully considered but they are not persuasive.

Examiner incorporates the section entitled "Response to Arguments" in this section in its entirety since Applicant's Representative did not address them in the present office action.

In addition to the aforementioned arguments, Examiner responds to the present arguments. Applicant argues that his claimed temperature range -- amended from 200-700 C to 480-700 -- is different from the prior art. Similarly, in the present amendments, Applicant has added the additional limitation from of a pressure range of 200-760 torr. But the pressure range as originally claimed (claim 37) was 0.1-760 torr. As noted above Applicant's specification clearly discloses that the broader ranges are appropriate. It makes it unlikely that the ranges as now

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claimed provide some unexpected benefit as required by the precedent established by *In re Huang*. Applicant must provide evidence of unexpected results to overcome these rejections.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 4,916,091 (Freeman et al.) also teaches a process similar to applicant's claims (see col. 16, ln. 63 to col. 17, ln. 55).

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication from examiner should be directed to Erik Kielin whose telephone number is (703) 306-5980. The examiner can normally be reached by telephone on Monday through Thursday 9:00 AM until 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached on (703) 308-2417. The fax phone number for the group is (703) 308-7722 or -7724.

EK

EK

Charles D. Bowers Jr.

Charles Bowers
Supervisory Patent Examiner
Technology Center 2800

January 18, 2001